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## No. II.

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*Description and Chemical Analysis of the Retinasphalt, discovered at Cape Sable, Magothy River, Ann Arundel County, Maryland. By G. Troost, M. D.—Read 19th Dec. 1823.*

IN the American Journal of Sciences and Arts edited by B. Silliman, (Vol. III. p. 8) I published a description of a variety of amber, and of a fossil substance supposed to be a nest of an insect, discovered at Cape Sable, Maryland. This description was the result of only one analysis. It appears now, from subsequent trials, that there occur, at that place, two minerals, which are very similar in their appearance, viz. the true amber, and a resino-bituminous substance known by the name of Retinasphalt. It happened, accidentally, that I selected, for the first analysis, some fragments of the true amber; and in consequence, taking for granted that it was all the same substance, as the hardness, smell when burnt, &c. appeared, to be the same, I described it in the above mentioned Journal as amber. Having returned to my former residence, where I have every means to vary my researches, I have submitted this substance again to examination, and have discovered my error, and ascertained that it consists of two, if not of three, others, of somewhat different nature, viz. amber, Retinasphalt, and a substance which corresponds with what Jameson calls fossil copal.

I have now the honour to lay before the Philosophical Society the result of my investigations.

## RETINASPHALT.

The *Retinasphalt* is either perfectly opaque, or slightly transparent at the edges ; the colour exhibits every shade of a mixture of yellow, grey, and brown, sometimes arranged, in nearly concentric zones, so as to display the beautiful colours admired in the Egyptian jaspers, or disposed in alternate bands, dots, spots, clouds, as in the other agates or jaspers.

It yields with more ease to the knife than amber ; breaks easily, exhibiting a perfect conchoidal fracture ; and some varieties seem to be of the same hardness with amber, and sufficiently hard and compact to receive a fine polish. Other varieties are porous, having sometimes the appearance of bone which has been long exposed to the action of the sun, and being in that case also of a greyish colour.

In lustre it is inferior to amber, having more of the lustre of the gamboge, than that of copal ; and generally it seems to be intermediate between these. Sometimes it is dull, particularly the porous variety. When homogeneous, compact, and polished, it acquires by friction the negative electricity, in the same degree as amber ; the porous variety has this property in a feeble degree.

## EARTHY RETINASPHALT.

This usually occurs in fragments, or friable porous masses, from the size of a grain of maize and smaller, to that of a walnut ; having a dull earthy aspect, intermixed with pyrites. Its solidity does not exceed that of clods of loam or of a stiff soil, with which, externally, it has some resemblance ; and like this substance, it crumbles by friction between the fingers. Its colour is grey, or yellowish grey, like ashes. By exposure to heat it melts, and exhibits the properties of the first variety.

The first variety occurs in nodules or irregular masses, from the size of mustard seed to four or five inches in diameter. Its external surface is of a dirty grey colour, covered here and there with pyrites, which substance often penetrates the whole mass, and on the decomposition of which the whole cracks and crumbles to pieces. The surface is a crust which has in some pieces a thickness of one-eighth of an inch, and of whatever colour and lustre the included Retinasphalt may be, is always of a dirty grey and dull.

Its specific gravity varies much, and does not coincide with that given by Hatchet, who states it to be 1.13. I have repeated the experiment several times, and have constantly found that the fragments which did not contain any pyrites, did not exceed 1.04. Some fragments which floated on the surface of the water, I found to be 0.97 and 0.98, and consequently the specific gravity varies from 0.97 to 1.04, and is thus lighter than any of the resinous substances in their unaltered state which are found in the drug shops. These, according to Brisson, vary from 1.0182, as Elemi, to 1.1362 as Labdanum. I found also my supposition as to the great specific gravity, stated in the above mentioned memoir on amber, &c. verified; namely that it was owing to the intermixture of pyrites, which by its decompositions has crumbled several specimens.

### CHEMICAL PROPERTIES.

I digested some of it, broken up into small fragments, in pure alcohol. This fluid exhibited some action on the substance even when cold. In less than an hour, some of the colours, particularly the lighter ones, had lost their polish, and seemed to be covered with a dull earthy matter. After it had been exposed for two days to the action of alcohol, the whole of its gloss had disappeared, and though the fragments had retained their former shape, they had nevertheless undergone a change in their constituents: the alcohol

had dissolved something which had altered its former nature, and it resembled now, in some measure, the caoutchouc, being somewhat elastic, which elasticity nevertheless is again lost after some time. I then heated the alcohol to boiling, for a quarter of an hour, and after cooling it, decanted it. In this state it exhibited a yellowish colour, not quite as dark as that of madeira wine.

It was during these trials that I discovered that it contained two different substances ; as some of the fragments retained all their lustre and were unaltered by the action of alcohol. These I found to resemble, in every case, the true amber of the Baltic sea.

To ascertain the true composition of the substances upon which the alcohol acted, I digested 50 grammes in fine powder, during five days, in pure alcohol, with moderate heat, which gave a tincture of the colour mentioned above. This operation was repeated till the alcohol ceased to act.

All the spirituous solution, after being carefully decanted, was subjected to a slow distillation, which gave a residuum of a brown resin, weighing 20.75 grammes. The residue, which was insoluble in alcohol, was digested in boiling water, but without sensible effect. After it was carefully collected and dried, it weighed 28.25 grammes. It was of a dull ash grey colour, and friable, melting into a black and brilliant mass. When put on hot iron, it melted immediately, emitting much smoke, and at last burnt with a brilliant flame. Its odour is agreeable, approaching in the beginning somewhat that of amber, but soon resembling that of asphalt. A solution of pure potash dissolved upwards of one-fourth of it, which was precipitated by muriatic acid, forming a brown resinous precipitate. It was soluble by heat in fat oil, and had all the qualities of asphalt. After burning, it left 1.75 grammes of an earthy matter, soluble in sulphuric acid, and forming octaedral crystals by the addition of potash, leaving a small residuum of brown uncrystallisable sulphate of iron. So that this earthy matter was alumine and oxide of iron.

From these experiments, it appears, that this mineral is

the same as the Retinasphalt, which was first discovered at Borytrace, England, and is composed of

Particular resin	42.5
Bitumen	55.5
Alumine and iron	1.5
Loss	.5
	<hr/>
	100.0

The true amber, which occurs at the same place, is usually of a brown colour, and transparent when the piece is not thicker than one-eighth of an inch. Sometimes it is of a honey-yellow, resembling in that case the amber of the Baltic; but this variety is rare. I found pieces at that place of the size of three and four inches. By destructive distillation it gives succinic acid, and has all the other qualities of the amber of the above cited place. This mineral is distinguishable from the Retinasphalt by the action of alcohol upon it. When a piece of the latter is kept for some time in this fluid, it soon loses its lustre, and becomes covered with a dull grey crust; the amber on the contrary retains its lustre, and is not altered.

There occurs also a substance which has much resemblance to the copal; possessing the same colour and transparency. Alcohol seems to have little or no action upon it. It occurs at Cape Sable, only in grains not exceeding the size of a large pea.

It is probable that these vegeto-mineral substances are the products of the same species of trees, and that their peculiar nature is ascribable to local circumstances. They all occur at Cape Sable, in the same formation; but as can be seen in the description which I have published of that place in the above mentioned Journal, this formation is composed of different strata of minerals. The uppermost is a loose sand, the lower part of which is so strongly agglutinated by iron oxide, as to form a coarse ferruginous sandstone. This stone is some-

times so rich in iron as to constitute the compact brown oxide of iron (*dichter brown eisenstein* of Werner.) Below this stratum lies a bed of lignite, from three and a half to four feet in thickness. This bed contains nearly all the varieties of lignite, such as jet, brittle lignite, bituminous wood, and brown lignite, penetrated throughout by pyrites. The junction of this stratum with the above is a mixture of lignite and sand, no abrupt separations being perceptible. It is in this stratum that the Retinasphalt and amber are found; the latter invariably on the very top of the stratum of the lignite; sometimes as much as half a foot above this bed in the sand. The Retinasphalt occurs intermixed with wood and pyrites. This being invariably the case, would induce the belief that they were originally the same vegetable gum or resin, and that the difference which now exists between them is owing to their mineralogical position.